CHAPTER V
TRANSPORTATION

A. INTRODUCTION

The patterns of land development in a town are influenced greatly by the layout of the road network. The purpose of the road network is to provide important links for residences, businesses, and farms. The network, which contains roads with varying degrees of hierarchical function, is a dynamic system. One of the main goals of a town is to create orderly patterns of land development through increased control over the evolution of the road system.

The availability of an efficient transportation system is an important consideration for new businesses in their decision to locate or expand facilities. The enhancement of transportation systems is a strategy a town can utilize to attract facilities and expand the tax base. However, transportation system choices can have impacts on community character and resources. A properly designed road network can promote neighborhood safety by routing the heaviest traffic around neighborhoods without sacrificing street connectivity.[1]

Traffic is one of the more visible impacts of land development and economic activity. Traffic generated by residential, commercial and industrial land development not only affects the Town's local road network, but also impacts the regional highway system and inter-regional travel. Therefore, the Town must determine how its own growth patterns affects travel demands and to what extent the existing local and regional system can accommodate those demands. There needs to be a balance between maintaining community character and roadway efficiency and safety. When indicators of deficiencies such as higher than average accident rates are found to exist at a particular location, roadway improvements may be necessary to ensure safety, even if some sacrifice to community character results.

The intent of this chapter of the master plan is to provide an inventory of the existing road infrastructure, to present a history of traffic and operational characteristics of the highway network, and to identify desired improvements to the transportation system. It provides an inventory of the existing highway network in the Town, including highway classification, traffic volumes, roadway conditions and travel patterns. Issues related to transportation and mobility are discussed including highway policy, travel demand, and non-motorized and alternative modes of transportation. Recommendations to improve the highway network, and mobility in general, are also provided.

B. HIGHWAY CLASSIFICATIONS

1. State Aid Classification

The State-aid classification system was developed by the state of New Hampshire, as defined by RSA 229 – 231, to determine responsibility for construction, reconstruction and maintenance as well as eligibility for use of state aid funds. The following is a description of the state-aid system:

> Class I, Primary State Highway System, consists of all existing or proposed highways on the primary state highway system, excepting all portions of such highways within the compact sections of towns and cities, provided that the portions of turnpikes and interstate highways within the compact sections of those cities are Class I highways.

1 APA Planning Advisory Service, *The Principles of Smart Development*, Report Number 479, page 8.

Class II, Secondary State-Highway System, consists of all existing or proposed highways on the secondary state highway system, excepting portions of such highways within the compact sections of towns and cities. All sections improved to the satisfaction of the Commissioner are maintained and reconstructed by the State. All unimproved sections, where no state and local funds have been expended, must be maintained by the Town or city in which they are located until improved to the satisfaction of the highway commissioner. All bridges improved to state standards with state-aid bridge funds are maintained by the State. All other bridges shall be maintained by the city or town until such improvement is made.

Class III, Recreational Roads, consist of all such roads leading to, and within state reservations designated by the Legislature. The NH DOT assumes full control of reconstruction and maintenance of such roads.

Class IV Highways, consist of all highways within the compact sections of cities and towns listed in RSA 229:5, V. The compact section of any such city or town shall be the territory within such city or town where the frontage on any highway, in the opinion of the Highway Commissioner, is mainly occupied by dwellings or buildings in which people live or business is conducted, throughout the year. No highway reclassification from Class I or II to Class IV shall take effect until all rehabilitation needed to return the highway surface to reputable condition has been completed by the State.

Class V, Rural Highways, consist of all other traveled highways, which the Town or city has the duty to maintain regularly.

Class VI, Un-maintained Highways, consist of all other existing public ways, including highways subject to gates and bars, and highways not maintained in suitable condition for travel for five years or more.

Scenic Roads, are special town designations of Class IV, V, and VI roads where cutting or removal of a tree, or disturbance of a stone wall, must go through the hearing process and written approval of local officials (See RSA 231).

The state aid classification road mileage in Litchfield is summarized in Table V-1. There are Class I, II, and V type roads in the Town. There are no roads in Litchfield classified by the state as Class III (recreational roads) or Class VI roads. The major source of funding for maintenance of minor collector roads and local roads comes from the Town of Litchfield and the New Hampshire State block grant for roads.

Table V-1: State Aid Road Classification In Litchfield

State Funding Classification	Mileage
Class I- Primary State Hwys - Route 102	0.937
Class II- Secondary State Hwys – Route 3A & Hillcrest Rd.	10.799
Class V- Town Roads – All other Litchfield Roads	63.000
Total	**74.736***

Source: NH Department of Transportation,

*** Town of Litchfield has 78 total miles of road in 2002, but final breakdown by class is not available at this time.**

As shown in Table V-1, there is a total of 74.736 miles of roads in Litchfield. Route 102 is classified as a Primary State Highway. Route 3A and Hillcrest Road are classified as Secondary State Highways. All other roads in Litchfield are classified as Town Roads.

The New Hampshire Department of Transportation (NH DOT) has defined a second tier for classification of roads in New Hampshire in cooperation with the Federal Highway Administration (FHWA). This scheme classifies roads and highways into different categories according to their functions as well as their source of funding. The Functional Classification scheme was developed to define eligibility for funds under federal programs. The following provides a description of the functional classification system characteristics of a road and highway network:

Functional System		**General Characteristics**
Principal Arterial	1.	Provides corridor movement suitable for substantial statewide or interstate travels and provides continuity for all rural arterials, which intercept the urban area.
	2.	Serves the major traffic movements within urbanized areas such as between central business districts and outlying residential areas, between major intercity communities, or between major suburban centers.
	3.	Serves a major portion of the trips entering and leaving the urban area, as well as the majority of the through traffic desiring to bypass the central city.
Minor arterial	1.	Serves trips of moderate length at a somewhat lower level of travel mobility than principal arterials.
	2.	Provides access to geographic areas smaller than those served by the higher system.
	3.	Provides intracommunity continuity, but does not penetrate identifiable neighborhoods.
Collector	1.	Collects traffic from local roads and channel it into the arterial system.
	2.	Provides land access and traffic circulation within residential neighborhoods, commercial and industrial area.
Local	1.	Comprises all facilities not on higher systems.
	2.	Provides access to land and higher systems.
	3.	Through traffic usage discouraged.

Table V-2 provides a summary of the mileage for roads in the Town of Litchfield based on the NH DOT assigned functional classifications. Map V-1 illustrates the functional class of Litchfield roadways. Based on the state inventory shown in the table, the Class V (town maintained) road total equals 63 miles.

Table V-2: State Functional Classification Of Litchfield Roads

State Functional Classification	State Aid Road Classification					
	Class I Mileage	Class II Mileage	Class IV Mileage	Class V Mileage	Class VI Mileage	Totals
Category 02 Principal Arterial (Rural)						0.00
Category 07 Major Collector (Rural)		3.36				3.36
Category 08 Minor Collector (Rural)				4.529		4.529
Category 09 Local Roads (Rural)				35.299		35.299
Category 14 Principal Arterial (Urban)	0.142					0.142
Category 16 Minor Arterial (Urban)	0.795	4.997				5.792
Category 17 Collector (Urban)		2.442		1.521		3.963
Category 19 Local Roads (Urban)				21.651		21.651
Total	**0.937**	**10.799**		**63.000**		**74.736***

Source: NH Department of Transportation.

*** Town of Litchfield has 78 total miles of road in 2002, but final breakdown by class is not available at this time.**

2. Federal Aid Classification

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) significantly restructured the federal-aid transportation program. ISTEA was re-authorized and revised in 1998 (the Transportation Equity Act for the 21st Century, TEA-21). Descriptions of the various programs, which emerged from these transportation bills, are as follows:

National Highway System (NHS): This program funds projects on the designated national highway system on an 80% federal, 20% state/local basis. There are no highway routes in Litchfield designated as part of the National Highway System

Surface Transportation Program (STP): This program funds projects chosen by states and localities for any facility with a higher functional classification than rural minor collector. Roads in Litchfield eligible under the STP category include NH 3A, NH 102, Hillcrest Road, Corning Road, certain sections of Albuquerque Avenue, and certain sections of Page Road. Funding is based upon an 80% federal and 20% state/local share. Projects selected by the Town using their allocated municipal funds or Enhancements require a 20% municipal match. There are four subcategories of STP funds applicable to Litchfield, as described below:

A. STP < 200,000 - This category of STP exists to fund projects in small urban areas with a population under 200,000. There are statewide and municipal apportionments.

B. STP Any Area - This category of STP funds may be used in urban or rural areas.

C. STP Transportation Enhancements - This category funds projects submitted by municipalities and chosen through a statewide selection process. Eligible projects include: bicycle and pedestrian facilities, scenic improvements, and preservation of abandoned railroad corridors, historic preservation, rehabilitation of historic transportation facilities and mitigation of water pollution from highway runoff.

D. STP Hazard Elimination - These funds are earmarked for minor projects designed to eliminate hazardous roadway or traffic conditions.

Map V-1: State Functional Classification of Litchfield Roads

Bridge Rehabilitation and Replacement**:** This category includes bridges which are on-system, i.e. those that are functionally classified as higher than local, and off-system, which are municipally owned. The 80% federal/20% local share applies to the bridge category.

Congestion Mitigation and Air Quality (CMAQ): CMAQ funds are eligible for transportation related projects in ozone and carbon monoxide non-attainment areas. Projects must contribute to meeting attainment of national ambient air quality standards, through reductions in vehicle miles traveled, fuel consumption, reduced delay or other factors. Construction of roadway capacity serving single occupancy vehicles is not eligible for CMAQ funding. Funding is 80% federal, 20% state/local.

C. EXISTING HIGHWAY CONDITIONS

1. Traffic Volumes

Historic traffic volume data for the Town of Litchfield is compiled from several sources. The New Hampshire Department of Transportation (NHDOT) collects traffic counts in accordance with federal guidelines under the Federal Highway Performance Monitoring Program. The guidelines describe federal procedures for sampling highway and road volumes. These procedures provide the Federal Highway Administration (FHWA) with highway volumes for design standards and meet the Environmental Protection Agency's (EPA) requirements for estimating vehicular highway travel. In addition to the NHDOT's annual traffic counting program, the Nashua Regional Planning Commission (NRPC) maintains an ongoing traffic count program for validating the region's traffic model. The NRPC also provides traffic counts for member communities upon request.

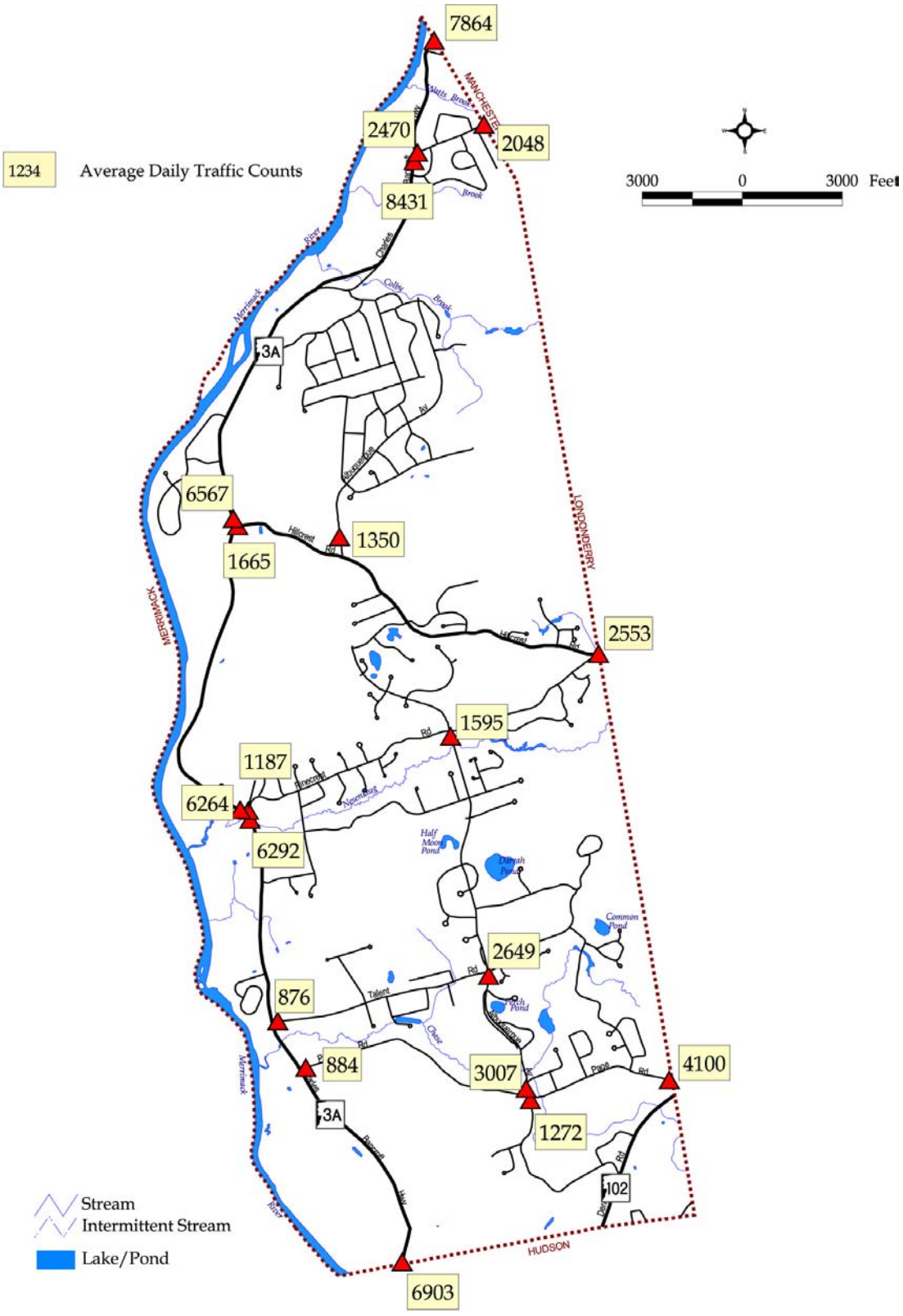
The most heavily traveled roads in Litchfield are NH 102 which runs east west from Hudson to Londonderry, and NH 3A (Charles Bancroft Highway), which runs north south through the western section of town from Hudson to Manchester. Historic traffic growth for Litchfield is shown in Table V-3 and illustrated in Map V-2. These counts represent an average weekday (24-hour period) during the May to October traffic counting season and have not been adjusted by a seasonal factor.

Table V-3: Existing Weekday Traffic Counts And Roadway Level Of Service

Highway	Location	Existing Weekday Traffic	Trend Analysis Period	Average Yearly Change	LOS
NH 102	At Hudson town line	17,905	1988-98	1.1%	D
NH 3A	At Hudson town line	7,773	1989-98	2.2%	C
NH 3A	at Manchester city line	8,913	1988 -98	3.0%	C
Albuquerque Ave	S. of Talent Rd.	2,690	1988-98	4.2%	A
Corning Rd.	at Manchester city line	1,597	1988-98	1.2%	A
Hillcrest Rd.	at Londonderry line	2,470	1988-98	5.0%	A
Page Rd.	at Hudson town line	3,903	1988-96	0.7%	B
Pinecrest Rd.	E. of NH 3A	1,210	1988-96	-3.1%	A

Source: Nashua Regional Planning Commission.

Map V-2: Average Daily Traffic On Litchfield Roads



2. Highway Capacity Analysis

Using the observed traffic count data, it is possible to evaluate the performance of highway facilities through the use of highway capacity analysis. The principal objective of this procedure is the estimation of the maximum amount of traffic that can be accommodated by a given facility. It provides tools for the analysis, improvement of existing facilities and for the planning, and designs of future facilities.

"Level of Service" (LOS) is a term which denotes the type of operating conditions which occur along a roadway or at a particular intersection for a given period of time, generally a one-hour peak period. It is a qualitative measure of the effect of a number of operational factors including roadway geometrics, travel delay, freedom to maneuver and safety. Level of service categories for roadway segments and descriptions are explained below.

Level of Service "A" represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.

Level of Service "B" is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is still relatively unaffected.

Level of Service "C" is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. Occasional backups occur behind turning vehicles.

Level of Service "D" represents high-density, but stable, flow. Speed and freedom to maneuver are restricted, and the driver experiences a below average level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level of Service "E" represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform level. Freedom to maneuver within the traffic stream is extremely difficult, and is generally accomplished by forcing other vehicles to give way. Congestion levels and delay are very high.

Level of Service "F" is representative of forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount, which can traverse the point, resulting in lengthy queues.

Table V-4 indicates the relationship between traffic volumes and level of service for various roadway types. Table V-4 provides the daily weekday volumes for important Litchfield roadways, along with the levels of service for each particular road.

Table V-4: Maximum Daily Traffic For Each Level Of Service By Roadway Type

(Per Two-Way Single Lane Volume)

	LOS A	LOS B	LOS C	LOS D	LOS E
Expressway	10,000	19,000	27,000	32,000	38,000
At-grade Principal Arterial	4,200	7,500	12,000	18,000	28,000
Minor Arterial	4,000	7,000	11,500	17,000	26,500
Major Collector	3,600	6,300	10,400	15,300	23,800
Minor Collector	3,200	5,700	9,400	13,800	21,400
Local (Paved)	2,500	4,500	7,500	11,000	17,000

Source: Derived from procedures in the 1985 Highway Capacity Manual.

3. Accident Analysis

Accident rates can be measured for intersections based upon the number of accidents per number of vehicles present. The rate is calculated as the number of accidents per million entering vehicles (MEV) at an intersection. It is recognized that accidents involving personal injury are symptomatic of serious hazards. Thus, an additional analysis is conducted that weights the personal injury (PI) accidents by a factor of three and adds the figure to the number of property damage-only (PDO) accidents to produce a weighted figure known as the equivalent property damage-only (EPDO) accident total. EPDO rates for road segments and intersections are then calculated in the same manner, as are the non-weighted accident rates.

Table V-5 summarizes the accident analysis for the most recent three-year period for the highest accident generating intersections in Litchfield. Significantly higher than average accident rates are indicated at the poorly aligned intersections such as the Page Road/Albuquerque Avenue (southern segment of Albuquerque) intersection which has a weighted accident rate at 3.20 per million entering vehicles (MEV). The intersection of Pinecrest Road and Route 3A had the second highest rate at 1.30 MEV. The Route 3A, Hillcrest intersection, and the Cutler Road Route 102 intersection had the third and fourth highest accident rates. The accident rates are due to poor stopping sight distances at these intersections, especially the Page Road/Albuquerque Avenue intersection.

Table V- 5: Accident Rates At Litchfield Intersections

Average Annual Three-Year Accident Summary (1995-1997)

Intersection	Int ADT	MEV/ Year	PD	PI	Total		EPDO	Acc./ MEV	EPDO/ MEV
NH 3A/Pinecrest Rd.	7,000	2.56	0.3	1.0	1.3	=	3.3	0.52	1.30
NH 3A/Page Rd.	7,500	2.74	1.3	0.0	1.3	=	1.3	0.49	0.49
Page Rd./Albuquerque Ave.	4,000	1.46	0.7	1.3	2.0	=	4.7	1.37	3.20
Albuquerque Ave./Hillcrest Rd.	3,800	1.39	0.3	0.0	0.3	=	0.3	0.24	0.24
NH 102/Cutler Rd.	18,000	6.57	1.0	1.7	2.7	=	6.0	0.41	0.91
NH 3A/Talent Rd.	7,000	2.56	0.3	0.0	0.3	=	0.3	0.13	0.13
NH 3A/Hillcrest Rd.	8,000	2.92	1.0	0.7	1.7	=	3.0	0.57	1.03

Source: NHDOT.

4. Pavement Conditions

The Town's Highway Department surveys the conditions of Litchfield's roads on a regular basis. The Highway Department will then develop a five-year maintenance plan based on the survey. The

Town's Highway Department received funding in order to complete a more comprehensive survey and plan. Bedford Design Consultants was contracted to assist in the development of a road surface management plan. The consultant is assisting the Town in creating a 15-year plan for road improvements based on findings contained in the report. The serviceability and the cost of maintenance for a road within the initial 75 percent of a pavement's design life is less than one-fifth the cost of maintenance and reconstruction during the final 25 percent of the design life. The purpose of developing a pavement management system is to help the Highway Department determine when a road has reached that critical 75 percent point and to define repair strategies, aid in prioritizing repairs and provide information to facilitate the budgeting process.

5. Bridge Conditions

The NH DOT inspects locally owned bridges on local roads as well as state owned bridges; however; the bridges must have a clear span of at least 10 feet. Inspection and maintenance of culverts and other structures on local roads that do not meet this 10-foot span definition (which is set by state statute) are the responsibility of the Town. There are two bridges in Litchfield that are regularly inspected by the NH Department of Transportation; NH 3A over Chase Brook, and NH 3A over Sawmill Brook. The State of New Hampshire owns both of these bridges and they are both included on the state's official bridge list. There are no restrictions, structural deficiencies, or functional deficiencies listed for these two bridges in the state's official bridge list.

The Town of Litchfield does not own any bridges inventoried in the state's official bridge list; However, a bridge over Colby Brook is included in the design plans for the completion of Albuquerque Avenue between April Drive and NH 3A in the north end of town. The Department of Transportation regularly inspects bridges belonging to municipalities on class IV and V roads (in accordance with RSA 234:21-:25) and publishes the results of the inspections yearly in the state's bridge list. The state requires that the town must keep records. The inspections are a prerequisite for bridge-aid funds. A list of the bridges and the status of weight restrictions is provided in Table V-6 based on the New Hampshire Department of Public Work's bridge list.

Although the NH DOT inspects all locally owned bridges as well as state bridges, it only recommends a load restriction posting on locally owned bridges. The municipality bears the responsibility for installing signs for the posting of load restrictions, in accordance with NH DOT recommendations. The Town should develop routine inspection and maintenance for culverts and other structures on local roads that are not inspected or maintained by the state.

Table V-6: Bridge Condition Report

Bridge	Bridge Number	Owner	Status	Year Built
NH 3A over Chase Brook	053051	State	Open no restrictions	1930
NH 3A over Sawmill Brook	053145	State	Open no restrictions	1930

Source: NH Department of Transportation, Mini Bridge List.

D. TRAVEL PATTERNS

Information on origin and destination patterns for travel to workplace is available from the US Census. The 1990 Census data represents the latest available information on destination patterns for travel to work because 2000 Census data was not available at this time. The average commute to work, based on the 1990 Census, was 26 minutes. Most residents are employed outside of Litchfield. Based on nationwide increases in vehicle miles traveled and perceived advantages of living in New Hampshire, it is likely that residents will continue to be mostly employed outside Litchfield and that their willingness

to travel long commutes will not change dramatically. Table V-7 shows the distribution of Litchfield commuters.

Table V-7: Commuting Patterns From Litchfield

Place of Work	Number of Litchfield Commuters 1990 Census	Percentage
Litchfield	171	6.0 %
Nashua	762	27.0 %
Hudson	462	16.4 %
Merrimack	116	4.0 %
Manchester	549	20.0 %
Derry/Londonderry	162	5.5 %
Goffstown	112	4.0 %
Lowell Area	214	7.6 %
Haverhill and Lawrence	88	3.0 %
Greater Boston	183	6.5 %
Total	**2,819**	**100 %**

Source: 1990 US Census.

E. KEY HIGHWAY ISSUES

1. Access to Roads and Highways

The maintenance of safe and convenient access to roads and highways is an important element of transportation systems planning. To achieve this end, the following standards are recommended:

- The safest possible location for access shall be selected (NH RSA 236:13).
- There must be adequate drainage and grades to permit a safe and controlled approach to the highway in all seasons of the year (NH RSA 236:13).

For all access points, the following American Association of State Highway and Transportation Officials (AASHTO) standards should be applied:

Type of Road	Speed Limit, or if None, Typical Speed	Minimal Safe Sight Distance
(a) minor roads	30 mph or lower	200 feet
(b) through roads	31 - 40 mph	275 feet
(c) through roads	41 - 50 mph	400 feet
(d) major roads	50 - 60 mph	525 feet

2. Access Management

Access Management is the process of managing the placement of driveways on roadways, especially on those roadways classified as arterials. Arterial highways are similar to limited access freeways in that their primary function is to move people and goods over long distances quickly and efficiently. However, arterials do not have the benefit of strict access controls to adjacent parcels as do limited access highways. The speed and volume of traffic on an arterial is greatly reduced due to vehicles entering and exiting side streets and driveways. In general, access management policies involve the regulation of the number of driveways, the design and placement of driveways, and the design of

any roadway improvements needed to accommodate driveway traffic. The primary goal of implementing access management policies is to prevent the loss of roadway capacity due to development along arterials by reducing turning movements that conflict with through traffic. Roads classified as arterial in Litchfield include NH 3A and NH 102. Traffic congestion on both arterials is characterized as level of service "C" and "D" respectively. In order to preserve the existing road capacity, which has a theoretical limit, access management policies should be applied to future developments along both arterials.

The following general policies can be implemented by the Town through site plan review, driveway ordinances, and/or zoning regulations, to achieve the access management goals:

- Reduce the number of curb cuts along arterials and encourage the use of common driveways for commercial developments.
- Encourage the development of service roads parallel to arterials that allow for access to adjacent commercial developments.
- In Litchfield along the Highway Commercial (Route 102) zoning district there is frontage requirement of a minimum of 400 feet between access points along Route 102. In the Northern Commercial District, curb cuts along Route 3A are restricted to one access point per 500 feet. The purpose of these restrictions is to reduce the number of curb cuts and the traffic movement conflicts that result from an excessive number of points where vehicles are allowed to enter and exit on these highways. It should be an objective of the Litchfield Planning Board to also institute a policy of promoting fewer curb cuts in a similar fashion along Route 3A in the Southwestern Commercial, Transitional and Residential Districts.
- On other town roads, the minimum distance allowed between curb cuts along arterials should conform to Table V-8.

Table V-8: Minimum Distance Between Curb Cuts on Town Roads

Posted Speed Limit	Minimum Spacing
35 MPH	150 feet
40 MPH	185 feet
45 MPH	230 feet
50 MPH	275 feet

Source: "Access Management for Streets and Roads", FHWA, 1982.

- Require developers to fund road improvements that reduce the impedance of through traffic, such as right turn lanes, left turn pocket lanes, and bypass lanes for left turning vehicles.
- Place parking behind or beside buildings and screen parking when possible to make the building the focal point of the destination. Use green spaces to articulate the differences between driveways, parking, and pedestrian areas.
- Encourage easements between parcels for the interconnection of non-residential sites that allow employees and customers to move from site to site without repeatedly entering and exiting the arterial.
- Allow for pedestrian access between commercial developments. Crossing points for pedestrians should be across driveways rather than through parking areas.
- Non-residential driveway entrances should be designed to prevent vehicles on the arterial from queuing while waiting to access the site. By providing adequate depth or driveway length at the curb cut access, vehicles are allowed sufficient maneuvering space on site to

move away from the entrance and allow other vehicles to efficiently and safely enter or exit the site.

3. Right-of-Way and Travelway Width

A right-of-way (ROW) width of 50 feet (minimum) is recommended for all local roads in the Town, with the exception of private ways and drives. This will allow the upgrading of any roadway, if necessary, should development occur in a manner that was not anticipated. It will also allow for the inclusion of pedestrian and bicycle paths, where desired. A greater width may be required for arterial and collector streets.

Travelway width may vary depending on the type of roadway and the nature of the traffic. A minimum single lane width of nine feet is recommended for each direction of traffic traveling at slow speeds. Higher speeds or traffic volumes will require a wider lane width for each lane of traffic. Generally, the centerline of the travelway should coincide with the centerline of the ROW. The fifty-foot minimum ROW, however, not only allows upgrading of the roadway as stated earlier, but also allows for the diversion of the roadway to avoid difficult or sensitive natural formations during the course of construction.

The NH Department of Transportation distributes suggested guidelines for the minimum geometric and structural lay out of local roads and streets. These standards can be used as a guide in street design.

4. Development Impacts On Roadways

Communities face the problem of having to upgrade the local road network as new development occurs. To the extent that new development projects create a need for improvements, developers should be required to pay their proportion of the cost to implement these improvements. The developer contributions should bear a rational connection to the needs created by and the benefits conferred upon the subdivision.

5. Scenic Road Designation

As New Hampshire's residential, commercial and industrial development has grown, so has the need to improve the road system, thereby reducing the number of country roads that constitute an important asset to the State. To prevent the elimination of scenic roads, communities are enabled by State legislation to designate roads other than state highways as Scenic Roads. This law protects such roads from repair or maintenance, which would involve the cutting or removal of medium and large-sized trees, except with the written consent of an official body. The law is an important tool in protecting the scenic qualities of roads. The large trees and stone walls that line many rural roads are irreplaceable and contribute heavily to the New England character of the region's towns. Litchfield does not presently have any roads officially designated as scenic roads.

6. Cul-De-Sacs

Cul-De-Sacs can be an integral part of an efficient road network if properly designed. If improperly designed, cul-de-sacs can lead to an inefficient road system and level of service problems on collector roads. Cul-de-sac length should be limited to prevent extended streets with no outlet. Long cul-de-sacs increase the potential for blockage due to fallen trees, with no alternate access for emergency vehicles. One of the many issues raised when reviewing plans with cul-de-sacs is whether the road should extend to the property boundary. The Planning Board should encourage cul-de-sacs to the property edge to have less curb cuts off of major routes or where a future possible connection may be

appropriate for establishing an efficient road network in the Town. The Planning Board should discourage cul-de-sacs to the property boundary in the following situations:

- Where the cul-de-sac would be between two zones. For example, a through road leading from a residential zone to a commercial zone may not be appropriate. A through road may encourage truck traffic and patrons to drive through a residential neighborhood to get to the commercial area.
- Where extending it would produce a dangerous intersection.
- Where it is coming off an existing cul-de-sac. This may produce long cul-de-sacs, when an option of building a proper road network exists.
- Where an extension of the cul-de-sac to abutting property would not be feasible due to steep slopes, major wetland areas or other natural features of the land.
- Where an extension would lead to property, which would be better, serviced from another road.

7. Road Salting

The Town has an official policy of pre-treating roads using road salt on town maintained roads. A salt/sand mixture is then used as the snow progressively increases during a storm. It is left to the discretion of the Highway Department to determine how much salt is necessary to provide properly maintained roadways for the given weather conditions.

The low cost and abundant supply of salt makes it one of the cheapest and most efficient ways to clear ice and snow from winter roads. However, the impact of spreading vast quantities of road salt may cause higher total costs when other factors are included such as salt induced damage to agriculture and drinking water. Much of the salt applied to roadways eventually enters groundwater aquifers leading to increased sodium levels in drinking water supplies. Road salt runoff from highways percolates into roadside soils affecting salinity and alkalinity as well as deteriorating soil characteristics[2].

There are eight active wells in close proximity to NH 3A and two active wells along NH 102 in Litchfield. Much of Litchfield's agricultural lands are adjacent to NH 3A. Although the New Hampshire DOT uses only sufficient quantities of salt to restore safe travel during and after storms, road salt (sodium chloride) in general is the chemical of choice for storm situations on NH 3A and NH 102.

The Town should consider alternative deicing chemicals for use on roads during winter storms, in order to preserve its ground water sources and agricultural resources and should work with the New Hampshire DOT to study the long term affects of alternative deicers on the environment compared with the present policies.

F. Future Traffic Forecasts

1. Analysis Methodology

Future traffic volumes were projected to the year 2020, utilizing the NRPC regional traffic model and incorporating forecasts made by the NRPC, in conjunction with local planners, regarding land use growth within the study area. The traffic model converts land use inputs, specifically the number of housing units, employment and school enrollment, into vehicle trips based on pre-determined trip

2 Chemical Deicers and the Environment, Frank M. D'Itri, Lewis Publishers, 1992, Page 2.

generation equations. The equations were developed based upon a regional home-interview survey that produced specific trip generation data for the NRPC region. The trips were then distributed throughout the regional study area and beyond utilizing a "gravity" dispersal model. NRPC is currently updating its transportation model to improve base year calibration for future modeling efforts. Each municipality is divided into a number of sub-areas known as Traffic Analysis Zones (TAZ). All land use data are entered and vehicle trips are produced at the TAZ level. All trip distribution also occurs between Traffic Analysis Zones. Map V-3 illustrates the traffic analysis zone boundaries for Litchfield.

It should be noted that while the model has been calibrated to accurately represent existing conditions, predicting future traffic volumes is not an exact science. Land use growth is the important variable, and the future development scenario will depend upon changes in economic conditions, the ability of local planners to identify growth patterns and changes in environmental regulations. Changes in travel behavior, such as the continuing trend toward more autos per household, can also impact volumes in a manner the traffic model cannot predict.

2. Developable Land

An estimate of remaining developable land in Litchfield was made by the NRPC in consultation with the Litchfield Town Planner through an analysis of development constraints. These constraints are general landscape conditions that may pose a barrier to using land for residential, commercial or industrial development.

Table V-9 summarizes the results of this analysis by Litchfield Traffic Analysis Zones and type of zoning. Approximately 1,782 developable acres are available for residential development. At the current zoning densities for each residential zone, it would be possible to construct approximately 1,600 additional residential units in Litchfield (1,782 acres minus 10 percent for roads). About 173 acres are available in the commercial zone, with the bulk of this property being in zones 262, 265 and 274. There are 268 developable acres in the commercial/industrial zones, mainly in zones 264 and 275.

Map V-3: Traffic Analysis Zones in Litchfield

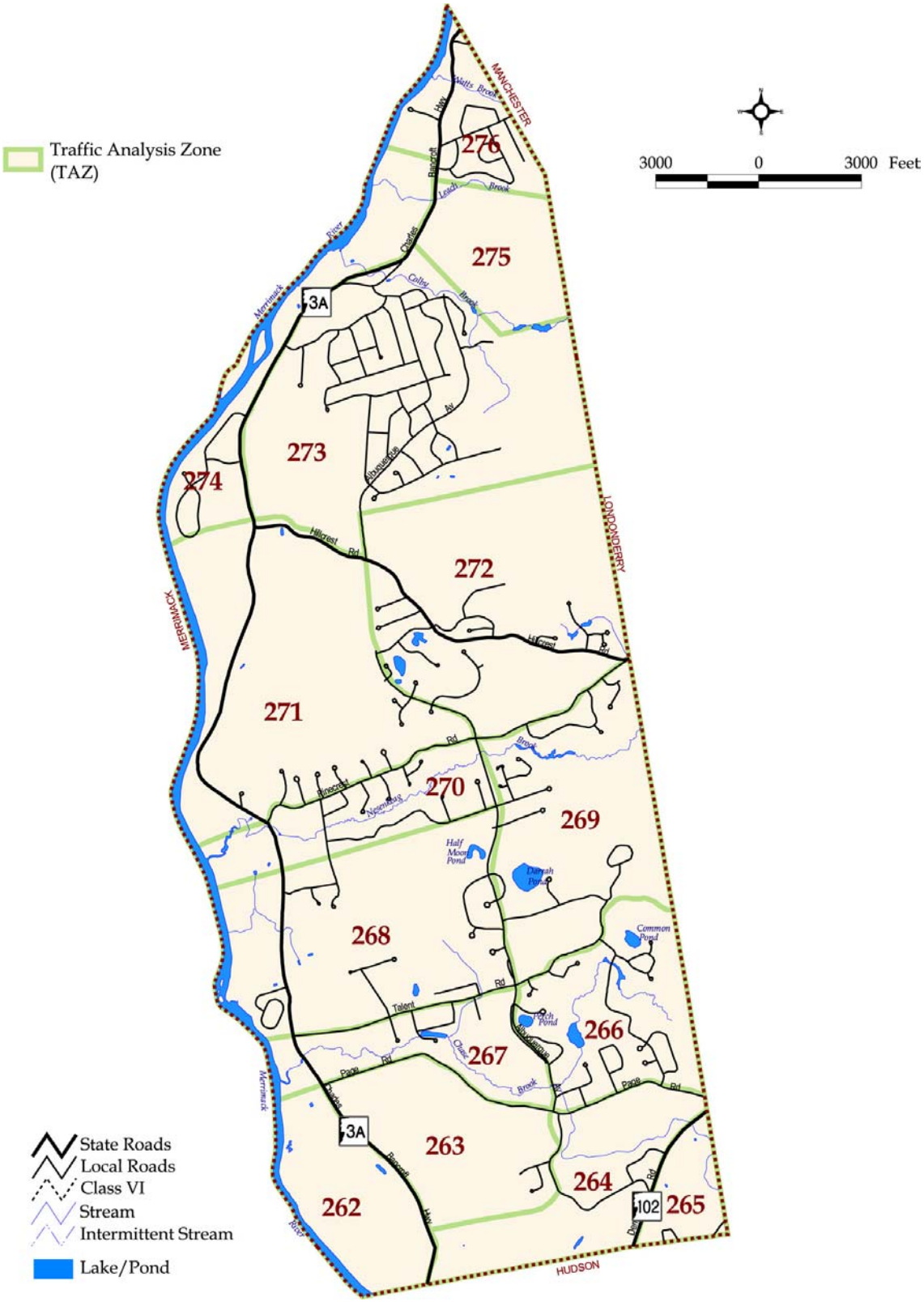


Table V-9: Remaining Developable Area Within Litchfield by Zone

TAZ	Total Area (Acres)	Developed Area	Total Vacant Area	Vacant Constrained	Unconstrained Vacant Area (Acres) Total Area	Zone C	RES	T	C/IS	C/I
262	439	292	147	84	57	41	0	16	0	0
263	528	399	129	29	91	0	24	44	0	23
264	512	209	303	76	206	3	15	89	63	36
265	158	69	89	39	46	46	0	0	0	0
266	559	434	125	73	47	0	47	0	0	0
267	380	222	158	99	53	0	53	0	0	0
268	1040	535	504	317	170	0	170	0	0	0
269	804	384	420	35	350	0	350	0	0	0
270	402	317	85	52	30	0	30	0	0	0
271	1249	674	576	301	250	0	250	0	0	0
272	1146	644	502	166	305	0	305	0	0	0
273	1426	865	561	213	316	11	278	20	0	6
274	485	258	227	117	100	71	29	0	0	0
275	344	48	297	110	170	2	2	26	0	140
276	312	214	98	61	33	0	29	4	0	0
	9,784	**5,564**	**4,220**	**1,774**	**2,224**	**173**	**1,582**	**200**	**63**	**205**

C Commercial District; minimum lot size 1 acre
RES Residential District; minimum lot size 1 acre single family, 1.5 acre for duplex
T Residential District with permitted institutions or offices min lot size 1 acre
C/IS Commercial/Industrial District, min lot size 1 acre
C/I Commercial/Industrial District, min lot size 1 acre
Source: Nashua Regional Planning Commission.

3. Projected 2020 Land Use

Table V-10 presents the projected growth inputs used for developing future traffic estimates. These projections were developed based upon the constraints analysis shown in the previous table, long-term trends in housing development patterns and likely commercial/industrial development types for the remaining available areas. NRPC provided valuable input in this growth analysis. However, it must be recognized that the regional economy is constantly changing and future trends will significantly impact the projected totals. In addition, changes in zoning or variances could result in changes to the market forecasts.

3,506 housing units is estimated for Litchfield by 2020, representing a 57 percent increase from the 1996 total (1,272 additional housing units). Trade employment is estimated to grow to 660 by 2020 and non-trade employment is projected to increase to 804.

Table V-10: 2020 Estimated Housing Units and Employment by Litchfield Traffic Analysis Zone

	Housing Units			Trade Employment (TE)			Non-Trade Employment (NTE)		
	1996	2020	Percent Change	1996	2020	Percent Change	1996	2020	Percent Change
262	24	24	0%	14	216	1443%	11	134	1118%
263	125	137	10%	0	0	0%	0	0	0%
264	90	100	11%	0	200	--	4	155	3775%
265	61	61	0%	42	47	12%	21	26	24%
266	282	380	35%	0	0	0%	2	3	50%
267	108	145	34%	0	0	0%	10	13	30%
268	269	345	28%	15	17	13%	1	1	0%
269	220	450	105%	0	0	0%	2	3	50%
270	96	147	53%	0	0	0%	6	8	33%
271	205	348	70%	15	17	13%	166	259	56%
272	325	632	95%	0	0	0%	4	5	25%
273	190	435	129%	13	15	15%	42	53	21%
274	59	98	66%	77	111	44%	32	65	103%
275	7	8	14%	6	37	517%	8	75	838%
276	173	196	13%	0	0	0%	3	4	33%
	2,234	**3,506**	**57%**	**182**	**660**	**263%**	**312**	**804**	**58%**

Notes:

TAZ	Development Type	Emp.	Category
262	100k S.F. retail mall	200	TE
	Conversion to prof. Office	20	NTE
	R&D firm	100	NTE
264	Moderate size industrial park	100	NTE
	50k sf retail	100	TE
	50 k sf conversion to retail	100	TE
271	20k sf ofc/service/industrial	50	NTE
274	25k sf office/retail	25	TE
		25	NTE
275	30k sf ofc/retail	30	TE
		60	NTE
	20k sf warehouse	5	NTE

TE = Trade Employment and NTE = Non TE

Source: Nashua Regional Planning Commission.

Running the regional traffic model with the 2020 regional land use forecasts produces weekday traffic forecasts for Litchfield shown in Table V-11. Along Route 102, a 30 percent increase is projected from 17,900 to 23,300 daily vehicles, resulting in a decrease of LOS from "D" to "E". Route 3A is projected to increase by 19.4 percent at the Hudson town line (from 7,750 vpd to 9,250 vpd) and by 51.6 percent at the Manchester line (from 8,900 to 13,500 vpd). The LOS on Route 3A is expected to decrease at the Manchester line from LOS "C" to LOS "D". Collector roads will also experience significant increases with Albuquerque Avenue and Pinecrest Road experiencing the most significant increases at 218.5 percent and 125 percent respectively. However, the collector roads are expected to operate at LOS "C" or better.

Table V-11: Forecasted 2020 Weekday Traffic Counts and Roadway Level of Service

Highway	Location	1997 Weekday Traffic	2020 Weekday Traffic	Percent Change	Vol./ Cap.	LOS
NH 102	at Hudson Line	17,900	23,300	30.0%	0.83	E
NH 3A	at Hudson Line	7,750	9,250	19.4%	0.33	C
NH 3A	at Manchester Line	8,900	13,500	51.6%	0.49	D
Albuquerque Hwy.	S. of Talent Rd.	2,700	8,600	218.5%	0.40	C
Corning Rd.	at Manchester Line	1,600	2,500	56.3%	0.11	A
Hillcrest Rd.	at Londonderry Line	2,450	3,750	53.1%	0.18	B
Page Rd.	at Hudson Line	3,900	6,900	76.9%	0.32	C
Pinecrest Rd.	E. of NH 3A	1,200	2,700	125.0%	0.13	A

Source: Nashua Regional Planning Commission.

G. AIR QUALITY CONSIDERATIONS

The passage of the Transportation Equity Act for the 21st Century (TEA-21) continues the intent of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), requiring that environmental and intermodal considerations be incorporated into NRPC area transportation plans and programs. In particular, it provides a framework for implementing the transportation mandates of the Clean Air Act Amendments of 1990 (CAAA). The CAAA mandated that all areas of the country meet federal standards for air quality by 1999. Failure to meet these standards at present results in a "nonattainment" designation for the area for one or more types of emissions. Nonattainment areas can be classified as marginal, moderate, serious or severe. In New Hampshire, the primary emission of concern is ground level ozone. The NRPC area is part of a larger southeast New Hampshire "serious" ozone nonattainment area. The CAAA mandated that an area designated as serious must achieve a 24% reduction by 1999 in order to achieve attainment. However, it became apparent that most of the ozone in New England is transported from industrial areas to the south. Because of the ozone transport issue, serious non-attainment areas in the state have until 2003 to meet the standards. Volatile organic compounds (VOC) and nitrogen oxides (NOx) are the two pollutants recognized as contributing to excess ozone production. These ozone-forming compounds, coupled with a stagnant air mass and abundant sunlight, chemically react to produce abnormal ozone levels. The State Implementation Plan (SIP) sets forth a budget of reductions for the emissions that must be achieved from stationary and mobile sources in order to achieve attainment within this time frame.

H. NON-MOTORIZED TRANSPORTATION

The rapid rate of growth within Litchfield has resulted in greater demands being placed on town roads, since the majority of residents use the automobile for most travel purposes. Suburban residential development typically results in a lack of alternative travel modes. To accommodate increased demand and to preserve the rural environment which residents favor, steps should be taken to provide citizens with opportunities to use a variety of travel modes for work and non-work travel. In particular in some situations, walking and bicycling may be viable options for alternative modes of travel.

1. Regional Bicycle & Pedestrian Plan

In 1995, the NRPC area towns (including Litchfield) which make up the region's Metropolitan Planning Organization endorsed the Regional Bicycle & Pedestrian Plan (RBPP). The plan was created to develop and implement a comprehensive bicycle and pedestrian system within the region. The primary goals of the plan are to increase the incidence of bicycling and walking by establishing a continuous, coordinated non-motorized transportation network and by creating a traveling environment in which bicycling and walking are attractive alternatives. The RBPP recommends physical and institutional improvements as well as a non-motorized network comprised of local and state roads on which bicycle and pedestrian improvements should be focused.

The key recommendations of the RBPP are to:

- Use the existing and planned street system to the maximum extent possible, consistent with safety considerations, for bicycle travel. The preferable facility for bicycle travel is a four-foot paved shoulder on existing roads; separated from motorized travel lanes by a 6 to 8 inch painted white stripe. Paved shoulders will serve the needs of all non-motorized users and minimize acquisition and construction costs, and is especially appropriate for the rural roads located in Litchfield. Shared roadways, with appropriate signage and safety improvements, are recommended where paved shoulders and bicycle lanes are not possible. "Bike Route" signage is recommended for all non-motorized road segments.
- Install five-foot sidewalks on both sides of arterial roads where possible. These facilities are desirable on high-volume corridors to improve walking safety. Sidewalks are also desirable on at least one side of collector roads. For rural and low-volume routes, paved shoulders may be used by both pedestrians and bicyclists.
- Provide pedestrian crossings at high-volume intersections on all arterial roads.
- Establish a regular non-motorized facility maintenance program. This program would include regular inspection of facilities to identify hazardous conditions, road shoulder sweeping, and maintenance of facilities based on safety considerations.
- Adopt land use strategies which facilitate non-motorized travel. Strategies such as encouraging mixed-use development, programming non-motorized improvements into the local Capital Improvements Program, requiring non-motorized improvements as a part of development approval, and adopting bicycle- and pedestrian-friendly design standards would result in a more attractive traveling environment for non-motorized modes.
- Implement non-motorized educational programs in schools. This program would teach children basic principles for safely sharing roadways with vehicles and would ideally incorporate on- and off-road training time. A key component of this program is teaching the importance of wearing bicycle helmets.

The Litchfield non-motorized network adopted in the NRPC Bicycle and Pedestrian Plan is shown in Map V-4. Route 102 was designated as part of the system, as well as portions of Route 3A from the Manchester line to the proposed intersection with Albuquerque Avenue. A portion of Route 3A in the south of the Town is also included from the Hudson line to the proposed intersection of Albuquerque Avenue. Local roads include Pinecrest Road from Route 3A to the Londonderry line and Albuquerque Avenue. In addition, the proposed northern section of the Circumferential Highway will include a separate bicycle path across the Merrimack River between the Towns of Merrimack and Litchfield. This bicycle path will link Route 3 (Daniel Webster Highway) in Merrimack and Route 3A in Litchfield.

As part of the NRPC bicycle study, an inventory was conducted to assess the suitability of each road for bicycle and pedestrian travel. The highlights of the survey are shown in Table V-12; complete results are available in the RBPP's Technical Supplement and an analysis of the routes is available on page 38 of the plan.

Table V-12: Inventory of Litchfield Non-motorized Network

Road Section*	Road Type (1)	Speed Limit	ADT (2)	Pavement Condition (3)	Grades (4)	Right of Way (5)
NH Route 102	2LU	45	15,500	G	M	E
NH Route 3A Hudson Line to Page Rd.	2LU	35	7,000	G	S	L
NH Route 3A Page Rd. to Colby Cir.	2LU	40	7,000	G	S	L
NH Route 3A Colby Cir to Manchester	2LU	40	7,000	G	S	L
Albuquerque, Meadowbrook to Page Rd.	2LU	35	1,700	G	S	E
Albuquerque, Hillcrest to April	2LU	30	1,400	G	S	E
Page Rd	2LU	35	3,900	G	S	L
Pinecrest Rd.	2LU	30/35	1,200	P	M	A
	(1) Type of Rd.		**(2) ADT**	**(3) Pavement**	**(4) Grades**	**(5) ROW**
	2L = 2 Lanes		Average	G = Good	F = Flat	E = Extensive
	U = Undivided		Daily	F = Fair	S = Slight	A = Adequate
	D= Divided		Traffic	P = Poor	M=Moderate	L = Limited
	OW = One way				E = Extreme	

Source: Nashua Regional Planning Commission.

2. Local Litchfield Trail System

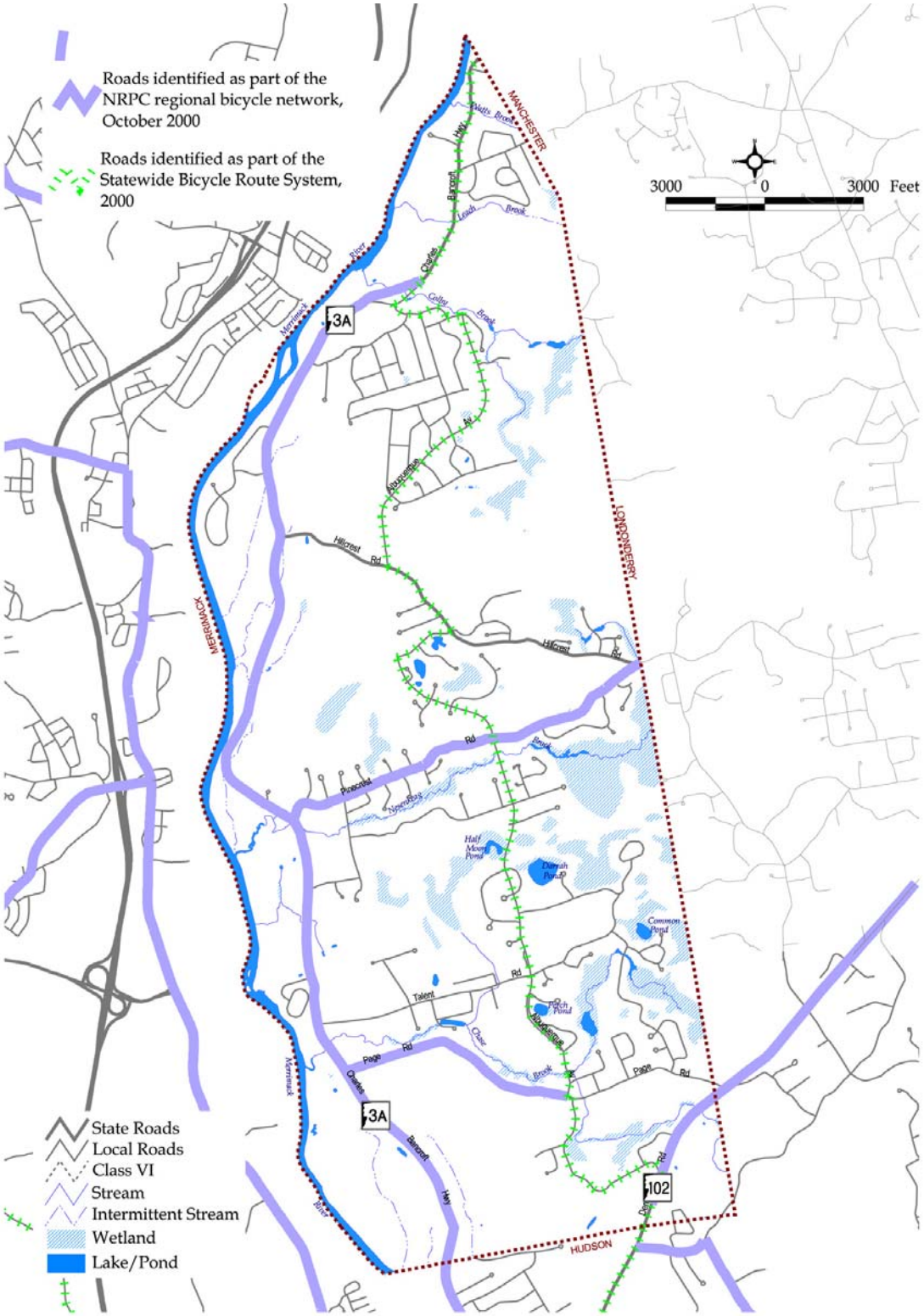
As discussed in the Community Facilities chapter of this plan, a trail network throughout the community will provide for recreational activities such as walking, hiking, bicycling and cross-country skiing. In cases where people live near their place of employment, the trail system may enable local non-motorized journeys to work. In some instances in Litchfield, the lack of sidewalks requires the provision of separate paths for safe pedestrian and non-motorized vehicle circulation. For instance, this is true along Albuquerque Avenue and Route 3A.

To accommodate the need for trails, a system of paths should be planned to correspond with the two major arterials in Town, providing connections to schools, parks and municipal facilities. Such a trail system should be designed to provide access to the Merrimack River where possible. Map V-4 also illustrates the components of a proposed local trail system for the Town of Litchfield.

The former Manchester & Nashua Street Railway right-of-way is still visible and vacant along portions of NH 3A and adjacent to the Merrimack River. Preservation of this right-of–way would provide a trail running the length of Litchfield. Some parts are unavailable at this time. New development and re-development, through regulation and cooperation from developers may allow for access to this valuable resource. Future easements have been offered in recent development along the railways route.

The remains of an old stagecoach trail runs through Litchfield toward Exeter. Parts of it are lost or overgrown, but it is still used between the library and middle school. Restoration elsewhere is needed.

Map V-4: Bicycle And Pedestrian Network



The proposed Litchfield trail system forms a loop that connects most public facilities in Town and provides access to the adjacent municipalities of Merrimack, Manchester and Hudson. The eastern part of the system links the industrial and commercial areas in southern Litchfield to the central residential core, the new high school, Darrah Park, Town facilities on Liberty Way, the State Forest, and the northern commercial and industrial area. This portion of the trail would be developed entirely within the right-of-way of Albuquerque Avenue and is listed in the RBPP.

The Western portion of the local trail system is linked to the eastern part at the proposed northern and southern intersections of Albuquerque and Route 3A. Additional east-west links are proposed north of Hillcrest Road and across school property from Windsor Drive near the old Town Hall and current fire station. The Western portion of the trail system follows the riverfront where possible and the right-of-way of Route 3A at other times. This portion of the trail links commercial, industrial and residential areas to schools, Town facilities, the library and the riverfront environment.

Development of the trail system may require municipal expenditures for much of its length. There are also federal funds appropriated to assist the development and enhancement of non-motorized transportation systems. All new developments within the corridor should be required to provide for completion of the system as part of subdivision and site plan review. Furthermore, all future road improvements should provide for expansion of the trail system.

I. POTENTIAL HIGHWAY IMPROVEMENT PROGRAMS

1. Circumferential Highway

The Circumferential Highway as a full-build project would involve construction of a limited access, four lane highway connection with the F.E. Everett Turnpike to the south at the Exit 2 interchange now under construction in Nashua and to the north at a new Exit 9 interchange just to the north of the Nashua-Merrimack line. The northern segment of the Circumferential Highway will connect from NH 111 east of Hudson Center northwesterly to an interchange with NH 102 in Litchfield south of Cutler Road. The highway will then run parallel with the Hudson town line and connect at an interchange with NH 3A. The highway will cross the Merrimack River, link at an interchange with the D.W. Highway near Pennichuck Brook and terminate at the F.E.E. Turnpike at the future Exit 9. The project is now slated for partial build construction that includes the northern segment only. The decision to down scale the project to partial build was made as an agreement between the State of New Hampshire and the Environmental Protection Agency due to the segmentation of wildlife and the disruption of wetlands which would result from to the completion of the full build scenario.

A Supplemental Environmental Impact Statement is currently being prepared which should enable the project to receive permits for construction in April of 1999. The most recent State of New Hampshire Ten Year Transportation Improvement Program 2003-2012 has scheduled construction on the Litchfield segments in the outer years of the plan. The project will be constructed in three phases. The following is the current planned schedule and scope of work.

PHASE 1 2009 t0 2011 Litchfield – Nashua:
Northern River Crossing Over Merrimack River (2 Bridges)
PHASE 1 2011 to 2012 Litchfield – Hudson:
Construct Mainline, Ramps, Toll Booths, NH 3A Improvements and Boat Ramp Access Road
PHASE 2 2011 to 2012 Litchfield – Hudson:
Construct Mainline & Ramps from NH 3A to NH 102

Source - State of New Hampshire Ten Year Transportation Improvement Program 2003-2012, Pg. 41-42.

The full build scenario, which includes the segment from 111 to the Sagamore Bridge, is not currently programmed by the NHDOT. Map V-5 illustrates the Circumferential Highway partial build route.

The Circumferential Highway has the potential to function as an intermodal facility. Construction of park-and-ride lots at the Route 3A interchange just north of the interchange would facilitate ridesharing for longer distance commuters. Also, there exists the potential for construction of a bicycle path along the Circumferential right-of-way, separated from the highway by fencing. The I-89 bicycle path provides an example of such a facility in the state.

Future traffic along the Circumferential is estimated at 16,000 vehicles per day along the segment from Route 111 to 102, rising to 23,000 along the segment to Route 3A and 29,300 along the Route 3A to Route 3, Merrimack segment. Traffic on Route 3A in Litchfield north of Circumferential Highway is projected to increase 20% to 13,100 from the No-Build alternative. This increase would not be sufficient to warrant corridor widening; however, it may hasten the need for general reconstruction of the highway. Traffic on Route 3A south of the Circumferential is projected to decrease 54% to 5,000, as the highway intercepts traffic that now uses the Taylor Falls Bridge to cross the Merrimack River. Only a minor increase on Route 102 north of the Circumferential is projected, but a 38% decrease to 16,900 is projected south of the new highway, again due to the interception of traffic heading west of the river.

The Towns of Litchfield and Hudson have contracted Vollmer Associates LLP to conduct the Litchfield – Hudson Townwide Highway Study, scheduled for completion in the fall of 2002. The purpose of the project is to evaluate traffic conditions town-wide, resulting in a twenty-year future growth scenario. Approximately thirty-seven intersections and three highway corridors are included in the study. The study will consider a growth scenario and the needed improvements resulting from the growth of the Town, construction of the Manchester Airport Access Road and the Circumferential Highway. Recommendations will include potential projects, approximate cost and prioritization of projects. The resulting data will facilitate better long-range planning and proper scheduling to maximize the potential for federal and state and local funding assistance. Local project scheduling and appropriations will be scheduled through the Capital Improvements Plan (CIP) process in conjunction with the stated goals and recommendations of the Master Plan.

One limitation of the NRPC traffic model is the fact that it does not analyze changes in traffic patterns from outside the study area that might occur as a result of a new regional facility. A statewide model has been developed that will assist NRPC in this task. One such impact of the Circumferential Highway may be to divert traffic, which now takes the Turnpike, I-293 and Brown Avenue (or in the future the Airport Access Road) to the Manchester Airport. Instead a number of drivers may elect to take a toll free route from the Turnpike to the Circumferential to Route 3A north through Litchfield, rather than pay the mainline toll on the Turnpike in Bedford.

Map V-5: Circumferential Highway Partial Build

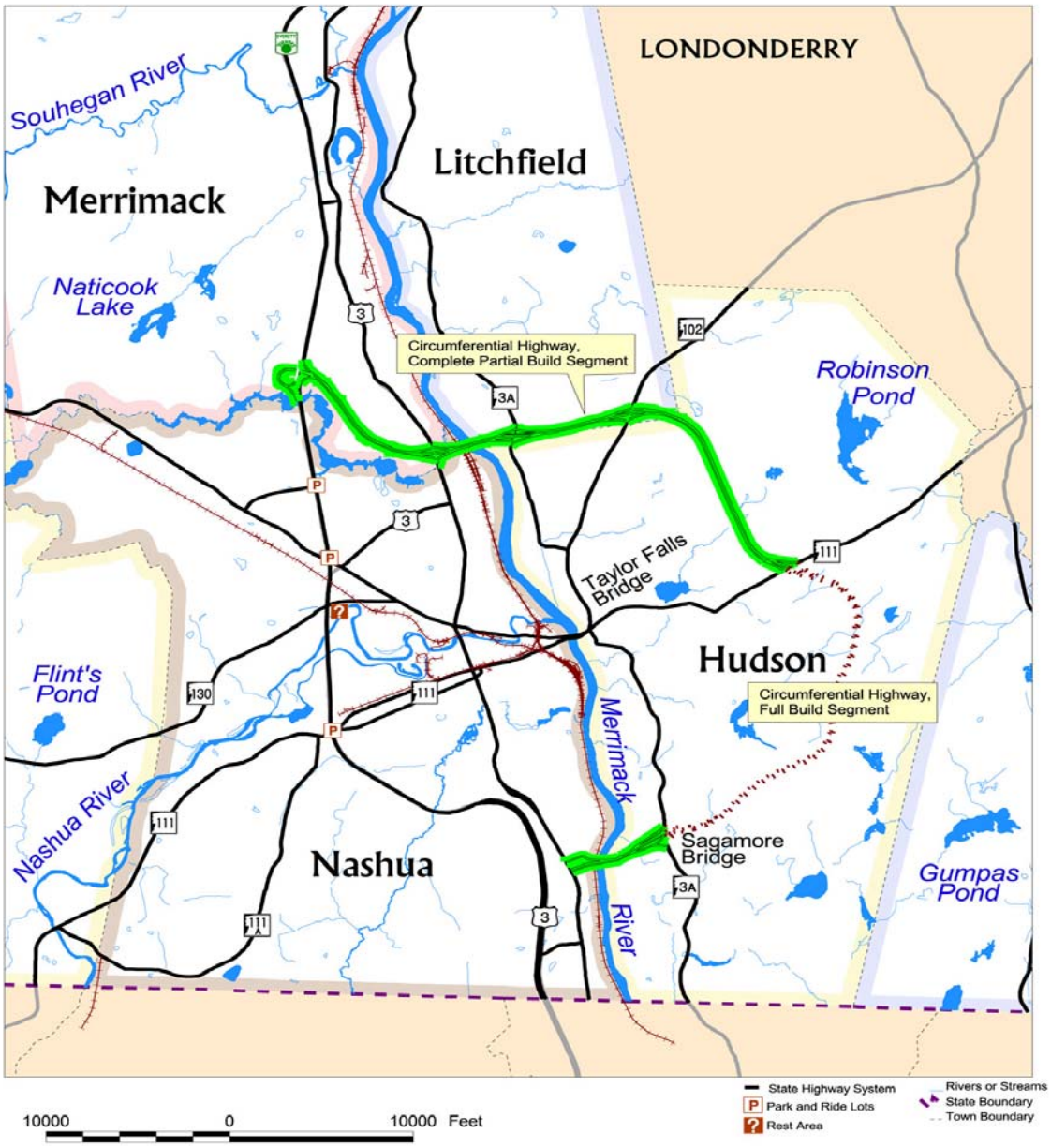


Table V-13: 2020 Traffic Forecast: Nashua-Hudson Circumferential Highway Partial Build, Without Route 3a To Route 111 Segment

Highway	Location	2020 No-Build	2020 Build	Percent Change	Vol./ Cap.	LOS
FEE Turnpike	N. of Exit 2	124,500	122,400	-1.7%	0.95	E
FEE Turnpike	N. of Exit 4	119,600	115,500	-3.4%	0.86	E+
FEE Turnpike	N. of Exit 9	63,500	60,900	-4.1%	0.54	C
Sagamore Br./Circ.Hwy.	E. of D.W. Hwy. (S)	57,700	43,000	-25.4%	0.45	D+
Circumferential Hwy.	NH 111 to NH 102	--	16,000	--	0.18	B
Circumferential Hwy.	NH 102 to NH 3A (N)	--	23,000	--	0.29	B
Circumferential Hwy.	NH 3A (N) to US 3	--	29,300	--	0.39	B
Taylor Falls Bridge	Nashua-Hudson Line	51,200	31,000	-39.4%	0.86	E
NH 111, Hudson	W. of Circumferential Hwy.	28,000	26,100	-6.8%	0.78	E
NH 102, Litchfield	N. of Circumferential Hwy.	27,200	28,100	3.3%	0.85	E
NH 102, Litchfield	S. of Circumferential Hwy.	27,200	16,900	-37.9%	0.51	D
NH 3A, Litchfield	N. of Circumferential Hwy.	10,900	13,100	20.1%	0.50	D
NH 3A, Litchfield	S. of Circumferential Hwy.	10,900	5,000	-54.1%	0.19	B+

Source: Nashua Regional Planning Commission.

2. Manchester Airport Access Road

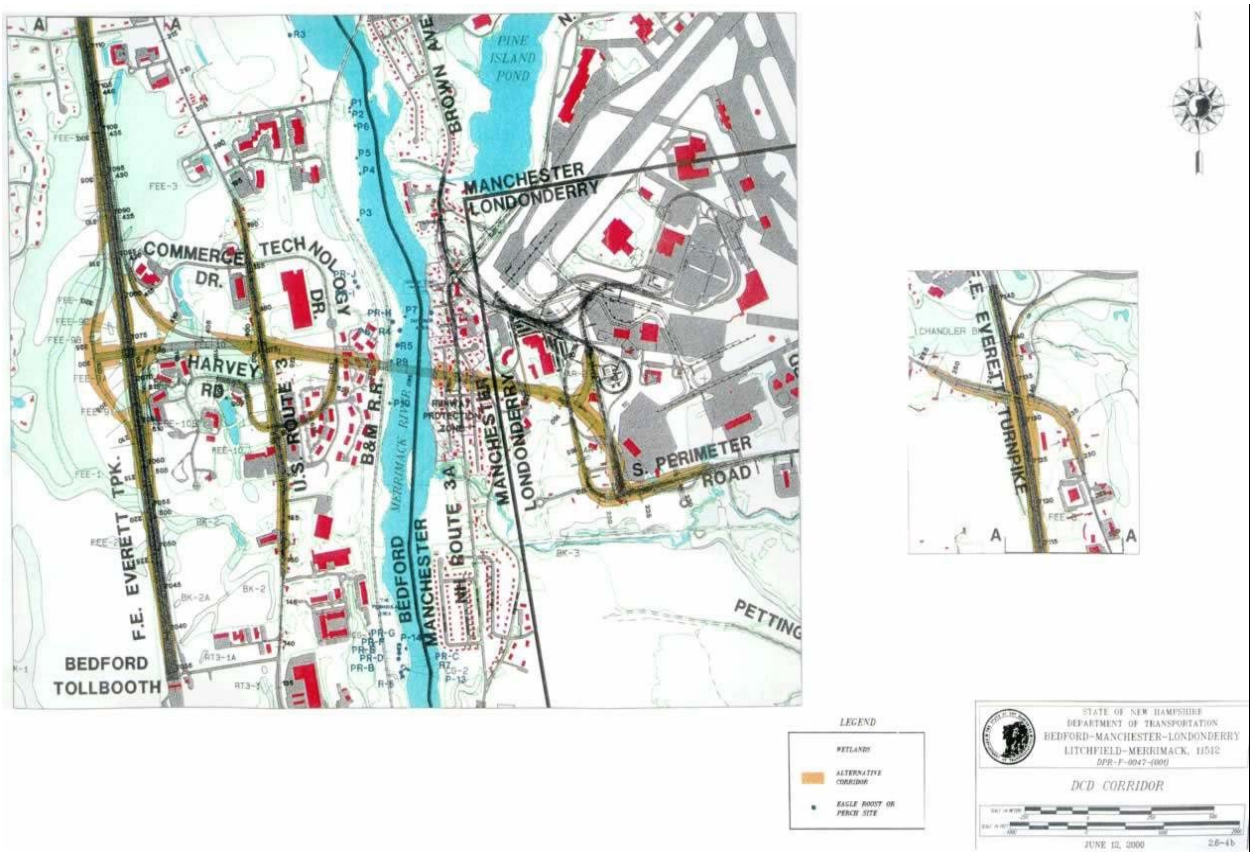
The need to address anticipated future growth at the Manchester Airport and surrounding area led the NH DOT to undertake a study in 1988 to improve access to the area. The process culminated in 1998 with the draft EIS for a Manchester Airport Access Road. Alternatives ranged from an upgrade of NH Route 3A (Brown Avenue) and surrounding roadways, to a new expressway running from the F.E.E. Turnpike to I-93. The preferred alternative provides a link between the Turnpike, US Route 3 and Route 3A, and creates a new crossing of the Merrimack River and a new highway to the Airport through the industrially zoned area south of the Airport.

The proposed roadway is a four-lane, limited access highway with interchanges at the Turnpike and US Route 3 that will intersect at-grade with Route 3A, then proceed easterly and northerly intersecting with the Airport's entrance road. The estimated project cost is $75 million.

The recent discovery of a Bald Eagle roost adjacent to the proposed airport access road bridge has necessitated adjusting the bridge location to accommodate the nesting site. Map V-6 depicts NHDOT's selected alternative location to the south of the previously bridge location. Significant delays are not anticipated as a result of this modification. The Town of Litchfield, through its Board of Selectmen, has expressed its strong support for the construction of the Airport Access Road, and has stated that a corridor connection with NH Route 3A is essential in order to access the Turnpike without traversing Brown Avenue to I-293. The EIS includes the Town's statement of support.

The Airport Access Road has been identified by the NHDOT as a major priority by the State.

Map V-6: Manchester Airport Access Road



3. NH Route 3A

There are several intersections along Route 3A including NH 3A/Page Road, NH 3A/Talent Road, and NH 3A/Hillcrest Road in which the stopping sight distances are limited. Improvements to the vertical and horizontal alignments of these intersections, as a long-term goal, would reduce accidents and enhance the safety of the corridor, and would also better accommodate larger vehicles such as school buses and fire trucks. The *Litchfield – Hudson Townwide Highway Study* is scheduled to present results in late 2002. NH 3A and a portion of NH 102 in Litchfield are being assessed. The purpose of the project is to evaluate traffic conditions town-wide, resulting in a twenty-year future growth scenario. Approximately thirty-seven intersections and three highway corridors are included in the study. The study will consider a growth scenario and the needed improvements resulting from the growth of the Town, construction of the Manchester Airport Access Road and the Circumferential Highway. Recommendations will include potential projects, approximate cost and prioritization of projects.

4. NH Route 102

NH 102 cuts through the southeast most section of the Town; however, it is the most heavily traveled arterial in the Town. The road presently operates under LOS "D" conditions and future analysis shows that the road will reach its capacity level (LOS "E") by Year 2020. The Town should apply access management techniques presented in this chapter, to preserve the capacity along the NH 102.corridor.

5. Albuquerque Avenue

The completion of Albuquerque Avenue is cited as a priority in the Town's 1998-2003 Capital Improvements Program Update. The completion of Albuquerque Avenue will contribute towards enhancing the connectivity of the road network and routing of traffic around neighborhoods. A corridor-long parallel bicycle path is also a goal of Litchfield, and the section from Page Road to Pinecrest Road has been completed by the State. In February 2001, the Town submitted the following applications to the NHDOT for federal funding. To date, funding has not been awarded to these projects due strong competition for limited funds. If funded, they will be incorporated into the NRPC Transportation Improvement Program. A 20% local match from the Town would be required for all successful applications. The new State of New Hampshire Ten Year Transportation Improvement Program 2003-2012 has scheduled Albuquerque Avenue projects **(bold type)** as follows. *(Litchfield's proposed Surface Transportation (STP) Enhancement Projects that made the 10 Year Plan are in Italics below.)*

(2005 to 2009) - Construct 0.3 mile Segment From April drive to NH 3A, Including Intersection Improvements at NH 3A.

1. *Construct Albuquerque Avenue segment from April Drive to Route 3A – estimated cost $850,000.*

(2012) - New Construction of Albuquerque Avenue with limits to be determined in coordination with the Town in the Future.

1. *Construct Albuquerque Avenue segment from Page Road to west of Cutler Road; estimated cost $1,575,000*
2. Construct Albuquerque Avenue segment from Meadowbrook Lane to Hillcrest Avenue; estimated cost $600,000

Source: State of New Hampshire Ten Year Transportation Improvement Program 2003-2012, Pg. 41
Town of Litchfield *Surface Transportation (STP) Enhancement Applications*, February 8, 2001

6. Page Road

Page Road provides an important east to west link between NH 102 and NH 3A in Litchfield. The northern segment of the Circumferential Highway will parallel Page Road and provide a faster and more efficient link between NH 102 and NH 3A, thereby reducing cut through traffic. However, Page Road will remain an important collector street for local traffic accessing Litchfield neighborhoods. The stopping sight distance at the westbound approach to the Page Road/Albuquerque Avenue intersection was measured at 180 feet by NRPC. This distance is below the required 225 minimum for the speed limit of 35 miles per hour. The accident data shows that this intersection experiences the highest rate of accidents of those included in the study. The stopping sight distance inadequacy is due to a steep grade on Page Road approaching Albuquerque Avenue from the east. The speed limit should be lowered to 25 miles per hour on the westbound approach to the Page Road intersection as an interim mitigation measure. Page Road should be re-graded at its intersection with Albuquerque Avenue as a permanent solution to the stopping sight distance inadequacies. These improvements can be made at the time when the extension of Albuquerque Avenue between Page Road and NH 3A is completed.

7. Talent Road

Talent Road is not a heavily traveled road; however, it does function as a collector road linking NH 3A to Albuquerque Avenue. Although the stopping sight distances at the Albuquerque Avenue/Talent Road intersection meet the minimum requirements, the accident history shows that there are repeat cross movement accidents involving vehicles failing to stop at the stop sign on the eastbound approach. Therefore, advanced warning signs posted on the Talent Road eastbound approach to the intersection can help improve driver awareness of the approaching stop sign. The installation of a flashing red beacon on the Talent Road approaches with a flashing yellow signal on the Albuquerque approaches will also help to improve safety at this intersection.

8. Hillcrest Road

The Litchfield Department of Public works presently has design plans for improvements to Hillcrest Road at the Route 3A intersection and the Albuquerque Avenue intersection. The purpose of the plan is to improve drainage and the vertical and horizontal alignment of the road. The improvements will increase stopping sight distances and will help to better accommodate safety vehicles such as fire trucks. The Litchfield Fire Department is planning to expand operations by adding a fire station to Liberty Way off Hillcrest Road. An engineering study should be completed to determine improvements in turning radii and the horizontal and vertical alignment of the Route 3A/Hillcrest Road needed to accommodate fire apparatus. The study should also include an evaluation of the vertical and horizontal alignment of Hillcrest Road.

9. Corning Road

The Town has submitted an application for inclusion in the NRPC TIP for reconstruction of the roadway, to be funded 80% federal, 20% local. The estimated project cost is $350,000.

J. ALTERNATIVE MODES

1. Paratransit

The Nashua Transit System provides demand-responsive transportation to elderly and handicapped persons within the City of Nashua and has contracted with the Towns of Hudson and Merrimack to serve their residents. Litchfield may want to consider a service contract with NTS in order to provide its elderly and handicapped residents with a low-cost, reliable source of transportation.

2. Passenger Rail

In 1991, special state legislation was passed that established a working group charged with investigating this project. In 1998 the Nashua-Lowell Commuter Rail Extension was identified in the TEA-21 Legislation as a potential New Start project. At the same time, Massachusetts announced plans to widen Route 3 from Nashua to Burlington, renewing interest in the commuter rail project. In 1999, NRPC completed a draft Major Investment Study with assistance from Vanasse Hangen Brustlin (VHB). As a result of this study, an extension of passenger rail service to Nashua from Lowell was deemed to have the greatest benefit of the alternatives considered.

Analysis of the rider market was originally conducted in 1988 and was replicated in 1998. The results showed an 80% increase in NH riders utilizing the northernmost MA rail stations. Nashua and Merrimack ridership increased by 1,337 percent and 154 percent respectively. The results also estimate approximately 950 riders per day from a Nashua rail station.

Currently, the station location being considered is on property of the recently closed Hampshire Chemical facility as the end of Spit Brook Road and DW Highway. Other locations considered were downtown Nashua and the Exit 2 area of the FE Everett Turnpike. Recently, CMAQ funds were awarded to NH DOT for rail station and park and ride facilities construction in Nashua and a second location in Merrimack at some point n the future. This will provide Litchfield's residents with a much faster and convenient mode of travel into Boston for commuting, business or social-recreational trips. Passenger rail service to southern NH is expected to become a reality in the next five to ten years.

K. GOALS AND OBJECTIVES

The goals for the Transportation element of the Litchfield Master Plan have been developed based on the objectives and analysis of the transportation system. The goals focus mainly on the issues of traffic congestion, access, and safety:

1. Complete Albuquerque Avenue

The completion of Albuquerque Avenue is cited as a priority in the Town's 1998-2003 Capital Improvements Program Update. The completion of Albuquerque Avenue will contribute towards enhancing the connectivity of the road network and will route traffic around neighborhoods. The project is scheduled for construction in the following phases:

- Construct Albuquerque Avenue segment from April Drive to Route 3A. (Partially completed)
- Construct Albuquerque Avenue segment from Page Road to south of Cutler Road
- Construct Albuquerque Avenue segment from Meadowbrook Lane to Hillcrest Avenue

- Construct pedestrian bicycle along segments from Pinecrest Road to Meadowbrook Lane and Hillcrest Road to Route 3A.

2. Access Management along NH 3A and NH 102

Access Management is the process of managing the placement of driveways on roadways, especially on those roadways classified as arterials. Arterial highways such as NH 3A and NH 102 are similar to limited access freeways in that their primary function is to move people and goods over long distances quickly and efficiently. However, arterials do not have the benefit of strict access controls to adjacent parcels as do limited access highways. The speed and volume of traffic on an arterial is greatly reduced due to vehicles entering and exiting side streets and driveways. In general, access management policies involve the regulation of the number of driveways, the design and placement of driveways, and the design of any roadway improvements needed to accommodate driveway traffic. The primary goal of implementing access management policies is to prevent the loss of roadway capacity due to development along arterials by reducing turning movements that conflict with through traffic. The Town should adopt a memorandum of understanding with the New Hampshire Department of Transportation regarding the implementation of access management techniques in the permitting of driveways along both NH 102 and NH 3A. NRPC has recently published a document titled *Access Management Guidelines* to assist in developing proper access management standards and techniques.

3. Improve Stopping Sight Distances to Reduce Accidents

- The accident data indicates that there are a number of intersections requiring improvements in stopping sight distance. Improvements to the horizontal and vertical alignment of the following intersections will reduce the number and severity of accidents in Litchfield:

  Page Road/Albuquerque Avenue
  NH 3A/Page Road
  NH 3A/Talent Road
  NH 3A/Hillcrest Road
  NH 102/Page Road

- Improvements to the vertical and horizontal alignments of these intersections, as a long-term goal would also better accommodate larger vehicles such as school buses and fire trucks. The Town should conduct an engineering study to determine the adequacy of the vertical and horizontal alignment on Hillcrest Road in accommodating fire trucks.

4. Anticipation for the Circumferential Highway and the Manchester Airport Connector

- The Town should call for more detailed study of the future impacts of the Circumferential Highway and the Manchester Airport Connector on traffic operations on key roads and intersections in the Town. (Currently under way in the Litchfield – Hudson Townwide Highway Study)

5. Grants and Resources

- The Town should seek funding for the completion of Albuquerque Avenue through the Surface Transportation Program of TEA-21. The Town should also seek Transportation Enhancement and Congestion Mitigation and Air Quality (TE & CMAQ) funding for the completion of sidewalk and bicycle trails.

6. Trail Network

- The Town should pursue the completion of a local trail system through use of the TE and CMAQ funding programs. The trail will provide for activities such as walking, hiking, bicycling and cross-country skiing. The local system will be connected to the state's regional system to provide for travel between communities.

7. Road Salting

- The Town should examine alternative de-icing chemicals to reduce the amount of salt entering the ground water due to winter surface treatment.

8. Pavement Management

- The Town should consider using Road Surface Management System software (RSMS) for pavement management. The software system will allow for an inventory of town roads to be compiled and will also provide documentation on the condition of road surfaces. The software system will allow the user to prioritize repairs and will assign a recommended repair strategy for each road or road segment. The system will also help in the preparation of a road repair budget.